

Notes and Objections

The Office Action requested correction of minor typographical errors in claims 1, 5, 10, 12, 16, 17 and 20. Applicants have editorially amended the claims according to the suggestions in the Office Action. Further, claim 17 has been editorially changed to enclose the reference characters in parentheses as suggested in the Office Action. It is respectfully submitted that the objections to the noted claims have been overcome. Accordingly, Applicants respectfully request withdrawal of the objections.

Rejections under 35 U.S.C. § 112, 2nd para.

Claims 5-9 and 19 stand rejected under 35 U.S.C. § 112, second paragraph. It is respectfully submitted that the inventive concepts are distinctly claimed. The Office Action requested claim 5 and 19 reference the winding pitch as it approaches the inner electrode. Applicants wish to point out that the inventive concept of the winding pitch of the linear conductor becomes continuously or stepwisely smaller corresponding to a distance from the inner electrode in the axial direction of the glass tube is shown at least in FIG. 6 and FIG. 10(a)-(f) of the present application. Applicants have recited the winding pitch as measured from leaving the inner electrode in the axial direction of the glass tube. It is respectfully submitted that the inventive concept remains clear. Hence, claims 5-9 and 19 are allowable. Accordingly, Applicants respectfully request the rejections be withdrawn.

Rejection under 35 U.S.C. § 102(b)

Claim 18 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Odagaki (JP 10-112290). Claim 18 has been rewritten in dependent format to now depend from allowable claim 19. It is respectfully submitted that claim 18 is allowable by being dependent on allowable claim 19. Applicants respectfully requests the rejection be withdrawn.

Rejection under 35 U.S.C. § 103(a)

Claim 16 stands rejected under 35 U.S.C § 103 (a) as being allegedly obvious over Odagaki in view of Adams (US Pat. No. 5,965,093) in further view of Yokogawa (JP 10-284008). The Office Action stated that Yokogawa “teaches the formation of an external electrode shape whose gaps change in width in the axial direction in order to vary luminous intensity.” (See Office Action, pg. 7) Applicants note that, the lamp of Yokogawa is based on a different principle of varying the luminous intensity from that of the present invention as recited in claim 16. That is, the lamp of Yokogawa varies the aperture ratio of the lamp by changing the gaps of the external electrodes along the axial direction of the tube. In contrast, the lamp of the present invention as recited in claim 16, varies the electric field intensity to vary the luminous intensity of the lamp. This significant difference drives from the difference in the electrode structures between the lamps. Accordingly, it is respectfully submitted that it would not have been obvious to one of ordinary skill in the art at the time of invention to modify Odagaki’s lamp with an external electrode where the winding pitch has a point of inflection in order to vary the luminous intensity. Thus, it is respectfully asserted that claim 16 is allowable.

Dependent claim 21 stands rejected under 35 U.S.C § 103 (a). Applicant note that claim 21 depends from any one the proceeding claims which are believe to be allowable or have been allowed. Thus, it is respectfully submitted that claim 21 is allowable.

New Claim 22

New claim 22 depends from allowed claim 20 and further defines the outer electrode structure. Nonetheless, claim 22 is allowed by being dependent upon allowed claim 20.

CONCLUSION

For the foregoing reasons, all pending claims are allowable and it is respectfully submitted that this application is in condition for allowance. Should the Examiner believe that anything further is desirable in order to place the application in better form for allowance, the Examiner is respectfully urged to contact Applicants’ undersigned

representative at the below-listed number. If any additional fees are required or if an overpayment has been made the Commissioner is authorized to charge or credit Deposit Account No. 19-0733.

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MARKED-UP VERSION OF AMENDMENTS MADE

IN THE CLAIMS:

Claims 1, 5, 6, 9, 10, 12, 15, 16, 17, 18, 20 and 21 have been amended as follows:

1. ~~A~~ The fluorescent lamp according to claim 5, comprising:
~~a glass tube both ends of which are sealed airtight and a discharge medium filled~~
~~in the inside;~~
~~a fluoresceent layer formed on the inner wall of the glass tube;~~
~~an inner electrode arranged at one end of the glass tube which is given with one~~
~~electric potential; and~~
~~an outer electrode composed of a linear conductor spirally wound around the~~
~~glass tube between its both ends at a prescribed pitch along an axis of the tube and is~~
~~given with another electric potential, wherein the outer electrode is so designed as to~~
satisfy the formula:

$$w \times n \leq 0.3$$

where w(cm) is a width of the conductor comprising the outer electrode and
n(turns/cm) is the average number of turns of the conductor in the unit length in the axial
direction of the glass tube.

5. A fluorescent lamp comprising:
a glass tube both ends of which are sealed airtight and a discharge medium filled
in the inside;
a fluorescent layer formed on the inner wall of the glass tube;

a first feeding lead wire penetrating one of the sealing portions of the glass tube airtight;

an inner electrode connected to an end of the feeding lead wire extended into the glass tube;

a second feeding lead wire composed of a linear conductor which is spirally wound around an outer surface of the glass tube along an axial direction of the glass tube and an end of which is electrically connected to the second feeding lead wire;

wherein the outer electrode is so designed that a winding pitch of the linear conductor becomes continuously or stepwisely smaller corresponding to a distance from the inner electrode in the axial direction of the glass tube.

6. A fluorescent lamp according to claim 5, wherein the discharge medium is composed of a xenon gas or a mixture of a a xenon gas with another rare gas.

9. A fluorescent lamp according to claim 7, wherein a specific resistance of the linear conductor forming the outer electrode is $2 \times 10^{-4} \Omega\text{cm}$ or less.

10. A fluorescent lamp comprising:

a slender and translucent tube with sealing portions formed at its both ends;

a phosphor film formed on an inner surface of the translucent tube;

a discharge medium containing rare gas filled in the translucent tube;

a first feeding lead wire ~~penetrated~~ penetrating one of the sealing portions of the translucent tube and sealed therein airtight;

an inner electrode provided at an end of the first feeding lead wire, and
an outer electrode composed of a linear conductor which is spirally wound around the translucent tube for almost the entire length of the tube in its axial direction and an end of which is connected to the second feeding lead wire;
wherein the outer electrode is provided with a tube power increasing means at a portion where a disturbed diffused positive column or a constricted positive column is generated in the translucent tube when the fluorescent lamp is operated.

12. A discharge lamp according to claim 11, wherein the winding pitch of the linear conductor of the outer electrode at the portion facing the diffused positive column becomes smaller as it ~~departs~~ aparts from the inner electrode.

15. A fluorescent lamp according to claim 14, wherein a specific resistance of the linear conductor forming the outer electrode is $2 \times 10^{-4} \Omega\text{cm}$ or less.

16. A discharge lamp comprising:

- a long and slender translucent airtight container;
 - a phosphor film formed on an inner surface of the translucent container;
 - an inner electrode provided in the translucent airtight container;
 - a discharging medium primarily composed of a rare gas filled in the translucent airtight container; and
- an outer electrode composed of a conductive coil which is substantially in contact with an outer surface of the translucent airtight container extending along its longitudinal

direction apart from the inner electrode and which enables it to generate discharge in the translucent container between the outer electrode and the inner electrode;

wherein the outer electrode contains at least one point of inflection where the winding pitch of the coil changes from a small value to a large value.

17. A discharge lamp comprising:

a long and slender translucent airtight container;

a phosphor film formed on the inner surface of the translucent container;

a pair of inner electrodes sealed in the translucent container at both ends;

a discharge medium primarily composed of rare gas filled in the translucent airtight container; and

an outer electrode formed with a linear conductor coil which is wound around the outer surface of the translucent airtight container along a longitudinal direction of the translucent airtight container at a prescribed pitch and which generates the discharge between the outer electrode and ~~not~~ the pair of inner electrodes;

wherein the winding pitch of the outer electrode becomes minimum in a region ~~pH~~ (pH) facing a pair of constricted positive columns ~~PCs~~ (PCs) generated in the translucent airtight container when the fluorescent lamp is in operation, becomes maximum at both ends in a region ~~pV~~ (pV) facing a diffused positive column ~~PCd~~ (PCd) generated in the translucent airtight container, and decreases stepwisely from the both ends toward the central portion.

18. ~~A The discharge lamp according to claim 19, comprising:~~

~~a slender and translucent tube having sealing portions formed at its both ends and being filled with a discharge medium;~~

~~an inner electrode which is arranged at one end of the translucent tube and is given with an electric potential; and~~

~~an outer electrode which is composed of a linear conductor which is spirally wound around the translucent tube between the both ends along an axis of the translucent tube at a prescribed pitch and is given with another potential;~~

wherein the outer electrode is so designed as to satisfy the formula:

$$w \times n \leq 0.3$$

where w (cm) is the width of the linear conductor forming the outer electrode and n(times/cm) is the average number of turns of windings per unit length in the axial direction of the translucent tube.

20. A discharge lamp comprising:

a translucent tube having sealing portions formed at its both ends;

a discharge medium including rare gas filled in the translucent tube;

a first feeding lead wire sealed penetrating airtight one of the sealing portions of the translucent tube;

an inner electrode provided at an end of the first feeding lead wire; and

an outer electrode composed of a linear conductor which is spirally wound around the translucent tube for almost its entire length in an axial direction of the tube and an end of which is connected to a second feeding lead wire;

wherein the outer electrode is provided with a tube power increasing means at a portion facing a disturbed diffused positive column or a constricted positive column generated in the translucent tube when the discharge lamp is in operation.

21. A liquid crystal display backlighting device comprising:

a main body;

a ~~fluorescent~~ lamp according to any one of the proceeding claims ~~1 through 15~~ provided to the main body; and

a lighting circuit to turn on the ~~fluorescent~~ lamp.